California State Lands Commission
Marine Invasive Species Program
Vessel Fouling Technical Advisory Group
Meeting Notes
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Meeting Notes

Chris Scianni – This is the first in a series of meetings. We will hold 3 or 4 meetings to develop management strategies for biofouling on ships in CA. Our mandate (as presented on screen) is that the Commission shall develop regulations governing the management of vessel fouling by January 1, 2012. Rulemaking in California takes 6-12 months, so we need something on paper by February 2011. That gives us six months to work on this issue. We want to develop a management strategy with your help and guidance. The purpose of today's meeting is to reconvene the TAG, reintroduce the Marine Invasive Species Program, and discuss what we've been doing to address this vector over the past 4-5 years. We will discuss existing legislation and reports, as well as data we've been collecting through the Hull Husbandry Reporting Form (HHRF), in

addition to research we've been funding. First up, Lynn Takata, lead author for the 2006 vessel fouling report, will discuss the report and enabling legislation.

Lynn Takata –The MISP began in 1999 with passage of Assembly Bill (AB) 703. At the time, there were no federal regulations, and so the state moved forward in the absence of federal guidance. The focus, at the time, was on the transfer of nonindigenous species (NIS) via ballast water from foreign vessels. The MISP was established with four sister agencies – the State Water Resources Control Board (Water Board), the Board of Equalization (BOE), the Department of Fish and Game (DFG), and State Lands Commission (SLC). AB 703 required ballast water management (exchange or retention) and submission of ballast water reporting form. The legislation sunset on January 1, 2004. Before the sunset, new legislation, AB 433, was passed. AB 433 (also known as the Marine Invasive Species Act) renewed and expanded the existing legislation, and expanded SLC duties. The new law required the development of regulations to address ballast water discharges from coastal voyages, the development of ballast water performance standards, and required SLC to address non-ballast commercial vessel vectors of species transfer (the focus for this meeting).

Fouling organisms attach to the wetted hard surfaces of vessels. Fouling may also include associated mobile organisms. In North America at least 36% of shipping-mediated introductions are due to fouling, and fouling is one of the most important vectors in Hawaii and the North Sea.

Requirements of the Marine Invasive Species Act related to vessel fouling include: 1) Consultation with the Water Board, US Coast Guard, and a TAG regarding the hull fouling issue; 2) Analysis of the risk of non-ballast vessel vectors for release of NIS; 3) Examination of the role of various vessel structures, such as vessel hulls, sea chests, and other niches on vessels, in the introduction of NIS; and 4) Recommend action to reduce the discharge of NIS via a report to legislature. The report was due in 2006. In 2005, the MISP put together a multidisciplinary TAG including state and federal agencies, academic/research groups, and the shipping industry. Four meetings were held. The first workshop was an orientation to current research and important issues. Additional meetings included discussion of risk factors that contribute to fouling, potential actions to be taken, and the pros and cons of management frameworks.

Not many management frameworks were in existence at the time. Most shipping companies keep fouling to minimum to reduce drag and fuel consumption, and the vast majority of industry and international class societies require vessel inspection on a 5-year cycle. These inspections often require dry docking. Because dry docking is expensive, most ships engage in vessel maintenance/painting during that time. They may also do in-water cleaning. At the time there were a few international and state management frameworks – 1) New Zealand had in place Codes of Practice and an information gathering survey; 2) CA laws required regular fouling removal, however "regular" was not defined at the time; 3) Hawaii had a framework for identifying high risk vessels; and 4) Australia had in-water cleaning restrictions in some locations for water quality purposes.

Little data was available at the time regarding fouling accumulation on vessels. Factors that affect fouling accumulation include vessel behavior (immobile periods, travel speeds), niche areas sheltered from sheer forces, hull husbandry activities, and environmental conditions (e.g. salinity, temperature). At the time of the 2005 TAG meetings there were no scientific studies of vessel fouling across a range of vessel types and/or behaviors. Most commercial vessels are regularly maintained, and there is little information on potential risk. In general case studies have shown that exaggerated fouling factors = high fouling = high risk. The major recommendations that came out of the TAG meetings included: 1) Authorize and broaden the state program to develop regulations addressing vessel fouling, especially for high risk situations; 2) Expand biological research; 3) Collect information on vessel behavior and maintenance; and 4) Address fouling & NIS on vessels under 300 GRT. The information from the TAG meeting and the recommendations were included in the report to the Legislature. The report was submitted in April 2006.

In response to the recommendations in the 2006 report, the legislature passed AB 740 in the fall of 2007. The legislation codified many of the recommendations in the report, expanding SLC authority to include vessel fouling. The legislation did not exceed most existing vessel strategies for cleaning, but did put a definition around “regular” cleaning requirements as either: 1) The expiration date of the full-term construction certificate, 2) the USCG certificate of inspection, or 3) no longer than 60 months since the last out-of-water cleaning. The legislation included requirements for in-water cleaning as well. Vessels must use best available technologies economically achievable and minimize the release of coatings and byproducts. In 2008 the US EPA released the Vessel General Permit. The Water Board Section 401 certification of the permit put a definition on “best available” technologies. The Water Board certification allows propeller polishing but not in-water cleaning of vessel hulls in harbors impaired for copper.

The 2007 legislation also required the Commission to gather information in order to fill key information gaps. The legislation provided the Commission with the authority to develop and implement a Hull Husbandry Reporting Form. The form, submitted annually, was developed in consultation with the TAG. The legislation also support the funding of research on fouling, and requires the Commission to develop regulations by January 2012 based on information gathered through research and the HHRF. Therefore to develop the regulations, we have called together the TAG. We will consider vessel design, voyage duration, and the best available technologies as we develop the regulations.

Daniel Kane – Recently 2 or 3 classification societies have approved a 7.5 year docking. Not sure if/how this will affect the 60 month docking cycle in law. Certain inspections will now be allowed on a 7.5 year cycle.

Chris Scianni – Is this specific to certain vessel types? Containerships?

Daniel Kane – Think so. The longer cycles includes inspections of the outer condition hull also structural components. The longer cycles are allowed by Germanischer Lloyd and Lloyd's Register. The effort was spearheaded by AP Möller.

Chris Scianni – Ok, we'll include this new information in the discussion. AB 740 gave us authority to collect information from the shipping industry and develop a HHRF. We convened a TAG in Dec 2007 and adopted the form in 2008. The form is an 11 question survey. The first section addresses hull husbandry – most recent dry docking, anti fouling coatings, in water cleanings, the use of an MGPS in the sea chests, etc… The second section addresses voyage characteristics including travel speed and port residency times. The form was delivered to industry in January 2008. The form must be submitted once each year. Currently, we have two years of data.

In 2008 the compliance rate was good, but not great - 74.4% overall for fleet. In the first year there were still some issues as to who should submit and when reporting should be done. Compliance rates for each vessel class were all over the map. Some were better than others. In 2009, we took advantage of the Ballast Water Reporting Form monthly notification system. At the end of the year we had 92.9% compliance. The data set is much more complete. Each vessel class except "Other" has at least 90% compliance.

Dominic Gregorio – What does SLC do if vessels are non-compliant?

Chris Scianni – We didn't pursue legal action in the first year. We notified the vessel agent if the form was not submitted. Most responded.

John Berge - What are "Other" vessels?

Chris Scianni – These vessels may include cable layers, cranes, ones that don't fit into other vessel classes.

Maurya Falkner – These are usually unique vessels that come in rarely, once every 3-4 years.

Chris Scianni – These vessels are potentially one of the most risky types. We definitely want to increase compliance for this vessel type.

Chris Scianni – I'm going to try to show both 2008 and 2009 data during my presentation. Because of space and clutter on the slides, sometimes I'll just show 2009 data because the dataset is more complete. We received about 360 more forms in 2009 than 2008. The pattern of vessels types submitting the HHRF is similar between the two years. Containers make up 1/3 of all forms received, tankers account for about a ¼ etc… (see graphs). Each form received represents a unique vessel operating in the state. The forms don't take into account the number of arrivals. So while passenger vessels and unmanned barges each make up less than 3% of the total population, most of these vessels make frequent repeated visits to California, so keep that in mind.

First question on HHRF – Asked about dry docking, when the paint was stripped and new paint applied. Paint type can vary by surface (or not). In past 5 years 99% of vessels arriving to CA were either dry docked or delivered as new. 85% were dry docked or delivered as new in the last three years, and two-thirds of vessels were dry docked or delivered as new in the last two years. So, a majority of vessels were cleaned/painted or delivered in last few years. Was the pattern due to the IMO TBT ban? We were hoping that the 2009 data set would shed light on that, but 2009 shows a similar pattern to the 2008 information.

John Berge – During 2008, 2009, and 2010 lots of new ships were delivered.

Chris Scianni – We looked at the fraction of dry docked vessels vs. newly delivered. The 2008 data show that 30% were delivered in the past 5 years. In the 2009 data set, 35% were delivered new in last 5 years. Tankers in particular, perhaps due to OPA 90 rules and the phase out of single hulls.

Vessels are using an assortment of different coating strategies. Most (80%+) of ships use strictly biocidal coatings (i.e. all AF coatings on the vessel are biocidal), and 80% of biocidal coatings used in CA are copper containing. 4% of ships use strictly biocide-free coatings (mainly foul release coatings, such as a silicone or fluoropolymer). 4% of vessels use both biocide and biocide-free coatings. Frequently they use the biocide free on smooth surfaces and the toxic coatings in protected areas. Some didn't provide an answer, and we received some unknowns. These data show vessel-specific use of antifouling coatings. Passenger ships and containerships using biocide-free coatings (40% of passenger, 15% of container). But passenger vessels only make up 3% of vessels operating in the state.

Vessels use Marine Growth Prevention/protection Systems (MGPS) in sea chests. The systems may use copper anodes that release small doses copper or the system may use a chlorine or hypochlorite system to prevent organisms from growing in sea chests and piping. How frequently are the systems being used? Auto carriers have the highest use at 85% of all vessels. Overall 55-60% of ships in CA are using MGPS in sea chests. Auto, container, tank, passenger using the most frequently. The 2 types of systems – copper vs. chlorine – are split evenly across both years of data.

In-water cleaning is a tool that vessels use between dry dockings. In-water cleaning frequently occurs when fouling produces heavy drag which increases fuel consumption. Ships use diver operated platforms with scrubbing brushes. Brush type varies, depending on coating type and fouling level. We looked at in-water cleaning and 'propeller only' cleaning. About 9% of vessels do in-water cleaning, mainly passenger vessels. Most cleaning is taking place outside of the US. In CA, 24 ships cleaned in-water since their most recent dry docking (or delivery). Half of those ships had biocide coatings on the hull. Cleaning on copper-containing biocide coatings is no longer allowed in CA ports and harbors due to the State Water Board's 401 Certification of the Vessel General Permit. However, in-water cleaning could take place outside of the

breakwater in LA-LB. One third of vessels cleaned in CA had biocide-free coatings. Cleaning of vessels with biocide-free coatings is still allowed in CA.

Traveling speed is thought to play a role in fouling accumulation on vessels, so we asked about the average traveling speed of each vessel over the 4 months prior to HHRF submission. The average traveling speed of vessels coming to CA is 16-17 knots. Several vessel types travel at 16 knots and above – containerships travel at 20+ knots. Slower vessels include unmanned barges which travel at an average of 8.5 knots.

We also asked about port residency times because the amount of time spent stationary in port is thought to influence the potential of accumulating organisms on the submerged surfaces. The average port residency time for passenger vessels, auto carriers and containerships is less than 1 day in port. For the rest, port residency times average between 2-4 days. There was an obvious dichotomy of short residency vs. long residency times.

Were vessels visiting freshwater before coming to CA ports? Freshwater may provide osmotic shock which could kill fouling organisms. 70% of vessels visited freshwater or passed through the Panama Canal since dry dock or delivery.

Dominic Gregorio – The Panama Canal is freshwater?

Ian Davidson – Yes, take 8-12 hours to pass through.

Chris Scianni – The HHRF also has a question about vessels calls at tropical ports, which may exacerbate fouling due to the environmental conditions. About 80% of vessels reported visiting tropical ports. Almost every class except unmanned barges reported visiting tropical ports.

The last question on the form asked about extended layups. One effect of the downturn in the economy is that vessels have been laid up. Many of the vessels that were in service during the boom times are now unemployed, waiting for cargo to move, and are laid up at various locations around the world. Accumulated fouling organisms may not always be cleaned before the vessel goes back in service. The vessel could then move those organisms around the world. We saw a big increase between forms submitted in 2008 and 2009 in the number of extended layups (10 days or greater). This doesn't mean layups occurred in 2008 and 2009, the question asked vessels to list layups since last the most recent dry dock. The layup may have occurred before 2008.

Phone question – Number extended layups in 2009. Does that mean out of the all vessels calling on CA ports?

Chris Scianni – Yes. 1600 layups, not necessarily 1600 ships. There were instances where one ship reported several different layups.

Dominic Gregorio – Do we know where these vessels were laid up?

Chris Scianni – Yes, I'll get to that in a moment. All of these occurred after the most recent dry docking. We did not confuse layup with dry docking. About 60% increase since 2008. Not just the number of layups. We also saw an increase in duration all the way up to 500 + days.

Gail Ashton – Were the 2008 layups taken out of the 2009 layups?

Chris Scianni – No, some of the layups from the 2009 forms are also reported in the 2008 forms. **Added for clarification** [These data represent a snapshot of the layups since the most recent drydocking. Some are newly reported (i.e. only on 2009 forms), some are reported on both 2008 and 2009 forms, and some were reported on 2008 forms but not 2009 (i.e. vessel was drydocked between 2008 and 2009 submissions)]

John Berge – Do we know when in 2008 the layup occurred?

Chris Scianni – We could track date based on data provided in the forms. The year references the year the reporting form was submitted, not the actual year of the layup. The actual layup could have been in 2007 or earlier, but we do have that information in our database.

Lynn Takata – The form asks about extended layups since the last dry dock. The vessels will list all extended layups since last the last dry dock, but the layup didn't necessarily occur in 2008 or 2009.

Chris Scianni – I'd like to show some individual vessel categories related to vessel layups. For auto carriers about 17 or 18 layups were reported based on the 2008 data. That jumped to 80 layups in the 2009 dataset. We also saw a big jump in the number of auto carriers laid up for 50-59 days. For containerships we saw the same sort of pattern – a 2-fold increase in the number of layups from 2008 to 2009. We also saw an increase in the duration as well. "Other" vessels – doubled the number of layups between 2008 and 2009, with a healthy number of 500+ day layups. For unmanned barges, we saw a 3-fold increase from 2008 to 2009, with an increase in the number of vessels having 30-39 day layups and 100-109 day layups. All except passenger ships experienced an increase in layups. Overall a 50-60% increase. Certain vessel categories were hit very hard.

Greg Ruiz – I have a question about the data. Are you adjusting on a per capita basis?

Chris Scianni – Not done yet.

Greg Ruiz – So we see a bit of a bump up due to additional reporting, but some duplicate numbers.

Chris Scianni – We'll do it [adjust per capita] in the future, but for this we didn't do it.

Chris Scianni – Overall, we saw large increase in every duration range for layups other than 200-299 days. Big jumps for 60-69 days, 70-79, and 300+. Where are layups occurring? Large increases in Asia and North American West Coast. Most of the Asian layups are located in Singapore.

John Berge – Where in America were west coast ships being laid up?

Chris Scianni – have the data, but don't know right now. **Added for clarification** [Many of the US West Coast layups were in the 10-19 day and 20-29 day ranges, and many laid up in Coos Bay, Everett, LA-LB, Port Angeles, Portland]

Dominic Gregorio – Not all ships are laid up at one time?

Chris Scianni – No, but some have been here for a while. Some are MARAD-owned and are sitting in Alameda or San Francisco for long periods

Dominic Gregorio – So the same ship may have been laid up in both N. America and Asia?

Chris Scianni – Yes, that could happen.

Greg Ruiz – I'd like to discuss the time since last dry dock. We see a fairly linear decline in number of vessels from 1-5 years since dry dock. Probably could factor out if going in to dry dock for TBT since we know the vessel age. We could maybe say if TBT is in play. Could probably get more details if we wanted to look into. I have another question about the figure that showed coatings being used by vessel type. A small percentage reported no coating – What was that about? Did they not provide data or indicated no coating?

Chris Scianni – Some vessels said no coating was applied during the last dry dock. Vessels could indicate full, partial or no-coating. If they listed partial or no-coating, they were supposed to provide when the most recent full coating occurred. About 5 vessels said no coating, and then didn't follow-up with when the last coating was applied..

Greg Ruiz - Last question. Have you divided up the freshwater data further to look at Panama Canal crossings vs other freshwater ports?

Chris Scianni - Yes, we have that data. We have two separate questions - one for the Panama Canal and one for visits to freshwater ports. We can look up the details and provide the data.

Greg Ruiz – The pattern for freshwater and tropical transits look similar. To what extent are they capturing the same route behavior? Panama is freshwater and also tropical.

Chris Scianni – The question doesn't ask them to list specific port visits, so very well could be both at the same time.

Greg Ruiz – Could see if Panama transits also listing tropical and try to determine independent transits.

Ian Davidson – On a different topic. Lots of vessel report layups or scores or hundreds days. We could look at in-water cleaning in relation to layup and see if the layup triggered in-water cleaning before they get going again.

Chris Scianni – It's on the to-do list. You would think most owners, to save money, would clean before getting going.

Lisa Swanson – How much longer will you be using the form? Do we have enough data? Is the plan to continue collecting data or are we done?

Chris Scianni – We will discuss that during the meetings. The requirement is to collect data until we develop regulations. We want to talk about whether or not we need to continue collecting this type of data or use a new form or questions to verify that ships are in compliance with regulations that will be passed.

Lisa Swanson – A lot of data has been collected already. It's a bit of a burden to do every year. It must be harder for larger companies. All forms are vessel by vessel which is a lot of work.

Chris Scianni – Matson is one of few companies that does forms for vessels at the corporate level. Most forms are coming in from the ships themselves.

Lisa Swanson – The forms come in from ships, and we review them. A lot of people touch the forms.

Chris Scianni – We'll definitely take that into consideration during the meeting. This is just one stream of data. There is also research being conducted.

Lisa Swanson – Just trying to interject a practical side to this.

Gail Ashton – For in-water cleaning, what constitutes an in-water cleaning event? How much has to go into in-water cleaning to be classified as such?

Chris Scianni – In the question we ask them to check which sections of the vessel were cleaned. If they just checked propeller polishing then it's not considered in-water cleaning.

Gail Ashton – Do most vessels clean everything?

Chris Scianni – If the hull sides or bottom or other protected areas are cleaned, then it's in-water cleaning. A lot of time vessel note cleaning the sea-chests and other protected areas. We can't verify that data. It's hard to get into the sea chests to clean. Have to take the data with a grain of salt.

Daniel Kane – Related to the transits through Panama, have any studies noted defouling as a result of passage through the Canal?

Ian Davidson – We've done a couple of experiments looking at biocidal affects of freshwater. It's not 100% effective, but very effective for soft bodied organisms.

Chris Scianni – That's a good segue into research. Folks from the Smithsonian Environmental Research Center (SERC) and Portland State University (PSU) are here to talk about what they've been doing for the last few years.

Ian Davidson – This is work done with Greg Ruiz, Gail Ashton, and Chris Brown. Since the initial TAG process we've done several desk studies and field studies. The desk studies have included methodology assessments, an examination of how to interpret data, a look at wetted surface area, traffic studies of west coast vessels, and a review of the fouling and invasion literature. In the field we started off sampling containers, and progressed to barges and cruise ships most recently. About 60 ships have been sampled. Also doing salinity trials, and working on the condition and reproductive status of fouling organisms as well as parasite studies.

For the methodology assessment, we've noted that fouling studies in the literature are a mix of methods. Prior to 2005 a lot of studies were done in dry dock. Important to consider that when interpreting results. The dry dock samples are skewed towards the end of the vessel's dry dock cycle. The end of cycle ships are more interesting biologically, but it's important to sample a range of vessels and time since dry dock. That work subsequently informed some directions for future sampling.

We have looked at sampling done in dry dock, with an ROV, and divers. Our preference is to dive ships– better data and bang for the buck. For fouling, wetted surface area (WSA) is equivalent to ballast water discharge data – it gives us an idea of potential inoculation size. In the absence of direct data from vessels themselves, WSA gives us the most info about inoculation potential. Looking at WSA to west coast, one-half of vessels [to the West Coast] arrive to CA. We see differences among ship types behavior and voyage models - all contribute to fouling accumulation and transfer. Connectivity among ports is important for secondary spread.

Our review focused on the fouling literature. Greg has recently led an analysis of CA invasion history. When looking at introduction from California to Mexico he found a total

of 290 NIS. 257 occur in California, roughly 80% of first reports occurred in CA (i.e. most species in CA, and most found in CA first before elsewhere on the coast). Wide range of uncertainty, lots of species may have been introduced by many vectors – cryptovectic. Overall biofouling-mediated introductions are increasing over time, not just California but across many regions. These desk studies have helped inform our field studies.

We have sampled 22 containerships– 9 using divers, and the rest using a remotely operated vehicle (ROV). The hull surfaces were largely clean. This coincides with data from Australia and highlights the importance of niche spaces. A couple of outliers had several meters of biofouling. Most ships did not have any fouling including on the dock blocks and other niche areas. These ships are fast moving. All are involved in the pendulum model of oceanic transport. Ships travel from Asia to America with several port stops along the west coast and then go back to Asia. For several ships we couldn't get any species-level info from the ROV. No new species were recorded.

More recently we have sampled barges, which can have more fouling. These vessels are slower, more regional, and have longer port residence times. Lots of variation from barge to barge. Not consistently higher fouling. Found some with no fouling but also some heavily fouled vessels. Even though they are floating boxes, there are still niche areas that must be attended to.

Most recent sampling has been on cruise ships. We don't have the species level information worked up yet, but it's similar to containerships. The hull surfaces are largely clean, but niche areas appear to be richer than containerships. For example, we found diverse fouling communities on the stabilizer. We found about 40 morphotypes from several ships. That's higher than containerships.

For the salinity trials we're trying to get an idea of effect of freshwater transit. We've looked at a couple of different biofouling communities. Freshwater is not 100% effective, certain barnacles and mussels survived. All soft bodies forms perished. Some utility for the management of biofouling. Our colleagues on the east coast in Chesapeake are doing similar research and we've been comparing data. They've seen similar data that soft bodied organisms tended to perish in freshwater. We're still working up the data.

Most recently we've been looking at the condition and reproductive status of organisms. Organisms need to be able to jump ship or reproduce. Also, not a whole lot of studies have been done on parasite status or how parasites are moved around the world. That's another component of this work. Seems that for most studies done in last 5-7 years, outlier ships and niche areas are consistent across studies for elevated risk of biofouling.

At a recent conference, International Paint folks said that certain paints are effective for niche areas, but it can be a hard sell to shipping companies (another paint, financial cost), and even when used they are difficult to apply. Can see how application is an issue. It's hard to sample in these niche areas. A lot of factors related to the behavior of ships contribute to fouling accumulation. Our studies and the New Zealand studies show that it can be quite complex how the number of factors interact in complex ways. There are no definitive links between the time since dry docking and the amount of fouling.

Chris Scianni – For the specialty paints, we have seen less than 5 reporting forms use them. Some had the name of a sea chest in the product. So, they are being used.

John Berge – What makes them special?

John Kelly – Either high biocidal content or best foul release properties. Some owners may be forced to go that way. Some work well based on sea chest designs etc…

Lynn Takata – For the freshwater studies, were there any mobile species that associated with the hard bodies species?

Ian Davidson – The plate studies included all organisms associated with the plates. The communities were pretty homogeneous. Some small fish, crabs, amphipods. Haven't identified all the species yet. One crab had no problem with freshwater, one or two fish were able to do it. The soft bodied sessile ones all perished. We saw some differentiation among hard bodied forms and also some mobile ones.

Chris Scianni – Did you use species found in Panama?

Ian Davidson – Yes, we used species local to Panama. We also have ship level data from one ship that was towed to Texas. Also have data that show that impact, or the speed at which organisms are immersed in freshwater may be an issue. The shock value of going through a lock may have an impact. The sudden vs. gradual introduction to freshwater may have different effects.

Gail Ashton – In studies from New Zealand, remnants of hard bodied organisms may facilitate additional species settling quickly on the dead organisms vs. the bare hull.

Greg Ruiz - Marine organisms don't like freshwater, so the biocidal effect is good. We don't know long term effects on vessels. A vessel may experience high mortality on a per transit basis. Even though the vessel may have a big hit, the recruitment dynamics may still be quite different than on exposed bare hull.

Daniel Kane – A recent remarkable example of defouling occurred when one ship went through the Manchester ship canal. They saw a significant change in the fuel efficiency. Also saw effect of wave washing. Fouling attacked by sun and waves.

Chris Scianni – Just looking at fuel consumption? Not based on hull surveys?

Daniel Kane – Just speed/fuel consumption analysis. No surveys of the hull were done.

Chris Scianni – So some portion of the community was affected, maybe, but we don't know.

Daniel Kane – Effect of hydrodynamics on a ship can make a noticeable difference.

Chris Scianni – Want to comment on Ian's conclusions that outliers and niche areas are of concern. When ships have in-water cleaning done, it's usually on the smooth areas of the hull, but not the niche areas. There is still a risk for fouling and species introduction.

Chris Scianni – That's it for today. Hope that we're all on level ground so that next time we meet we can have fruitful policy/management discussions. I will set up conference line for the next meeting which will take place October 21 at 10 am, PDT. The meeting will be the day following Prevention First at our offices in Long Beach.

Maurya Falkner – Our component of Prevention First will have more detail on the whole fouling issue. This meeting is a primer. Prevention First will be a more in-depth look at the issue. The following day [at the next TAG meeting] we'll start talking about where we go from here. What are the policy recommendations? We'll initiate that discussion.

Chris Scianni – Most of the sessions at Prevention First are filled with speakers who are on the line with us now. We'll try to get a schedule posted to the web.

Adjourn